

## ADDITIONS TO THE OAK FLORA OF EL SALVADOR

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Among the plants collected by John Tucker, a member of the University of California Expedition to El Salvador, Central America, there occur twenty-three collections of *Quercus*. The expedition, under the leadership of Dr. R. A. Stirton of the Department of Paleontology, University of California, was in El Salvador from November, 1941, to May, 1942. Seven different areas in this country were visited by Mr. Tucker, although in only three of them were oaks observed and collected.

The first of these localities was 5100 foot Mount Cacaguatique in the Department of Morazán. Here eleven numbers comprising four species were obtained on, and in the vicinity of, the coffee finca of General José Tomás Calderón. Headquarters of the finca lie on the north side of the mountain at an elevation of 4600 feet. This side of the mountain above 3000 feet, where the original growth has not been cleared for coffee plantations, is occupied by oak woods. The dominant components are *Quercus hondurensis* Trel. and *Q. peduncularis* var. *sublanosa* (Trel.) Mull., and in a few small areas, particularly on dry ridges, *Pinus oocarpa* Schiede. A few scattered individuals of *Quercus Skinneri* Benth. and *Q. vicentensis* Trel. are to be found here also.

The second locality was the 9000 foot mountain, Los Esesmiles, which lies in, and near the northern boundary of, the Department of Chalatenango, not far from the Honduran border. The upper slopes of this mountain proved to be the most interesting and profitable botanically of any of the areas visited in El Salvador. Eleven numbers of *Quercus* were collected here, representing eight species: *Quercus acatenangensis* Trel., *Q. eugeniaefolia* Liebm., *Q. flagellifera* Trel., *Q. oocarpa* Liebm., *Q. sapotaefolia* Liebm., *Q. Seemanni* Liebm., *Q. vicentensis* Trel., and one herein described. The expedition camp was established at an elevation of 7200 feet on the eastern slope of the mountain. It was on this side of Los Esesmiles, which bears a dense, luxuriant cloud forest, that most of the collections were made.

The third locality where *Quercus* was collected was the area lying just to the north of the Volcán de Santa Ana, in the Department of Santa Ana. The upper slopes of this volcano, as well as those of several smaller extinct volcanic cones on its north flank, are clothed with forest growth which in general aspect is rather similar to the cloud forest of Los Esesmiles. Most of the dominant arboreal species are different in the two areas, however. On the east side of the 6000 foot Cerro Del Águila (one of the small, extinct cones), a single collection of *Quercus Skinneri* Benth. was made, representing the only oak species noted in this area.

Had these oak collections been available at the time of the preparation of "The Central American Species of *Quercus*"

(Muller, Cornelius H. U.S.D.A. Misc. Pub. 477: 1-216. 124 pl. 1942), they would of necessity have occasioned considerable amplification of that paper. El Salvador and Nicaragua were admitted to be very poorly represented in the then extant collections of *Quercus*. The specimens herein reported represent numerous extensions of range and one outstanding new species, and have provided additional information which might have permitted more full specific descriptions and decided improvements in the key to species.

In the following list of species no effort has been made to incorporate specific characters which might be added to our knowledge of the various species nor to revise the key to species to accommodate these characters. Such corrections are nearly valueless if presented separately from the complete treatment and are best left to accumulate until a full revision appears profitable.

The specimens comprising this collection are deposited in the Herbarium of the University of California at Berkeley; duplicates are being distributed. All cited collections are those of Tucker.

Subgen. *Lepidobalanus* (Endl.) Oerst.

*QUERCUS OOCARPA* Liebm.? A collection without mature leaves is tentatively placed here. This would be the first collection of this species in El Salvador. *Quercus oocarpa* is known from Guatemala to Panama, and its occurrence in El Salvador would not be surprising.

DEPT. CHALATENANGO. Small tree 20 feet tall; bark very light gray; cloud forest on north-facing slope, elevation *ca.* 7300 feet; east side of Los Esesmites, April 4, 1942, 1200.

*QUERCUS PEDUNCULARIS* var. *SUBLANOSA* (Trel.) Mull. This variety, occurring from Guatemala to Nicaragua, was previously known in El Salvador only from the Department of Chalatenango.

DEPT. MORAZÁN. Slender tree 25 feet tall; oak woods on northwest-facing slope, elevation *ca.* 3600 feet; *ca.* 3 miles east of finca of General J. T. Calderón, Mount Cacaguatique, January 12, 1942, 779. Tree 30-35 feet tall; oak woods on northeast-facing slope; *ca.*  $\frac{1}{2}$  mile east of finca of General J. T. Calderón, Mount Cacaguatique, January 17, 1942, 808.

*QUERCUS VICENTENSIS* Trel. Known only from El Salvador. Previous collections were from the Department of San Vicente and from Comasagua, in the Department of La Libertad.

DEPT. MORAZÁN. Old tree 25-30 feet tall; leaves very pale glaucous beneath; elevation *ca.* 4900 feet; at top of "saddle,"  $\frac{1}{4}$  mile due south of hacienda buildings, finca of General J. T. Calderón, Mount Cacaguatique, January 17, 1942, 810. DEPT. CHALATENANGO. Tree 45 feet tall; top of dry ridge, elevation *ca.* 5000 feet; along trail from San Ignacio to Las Pilas, west side of Los Esesmites, March 22, 1942, 1109.

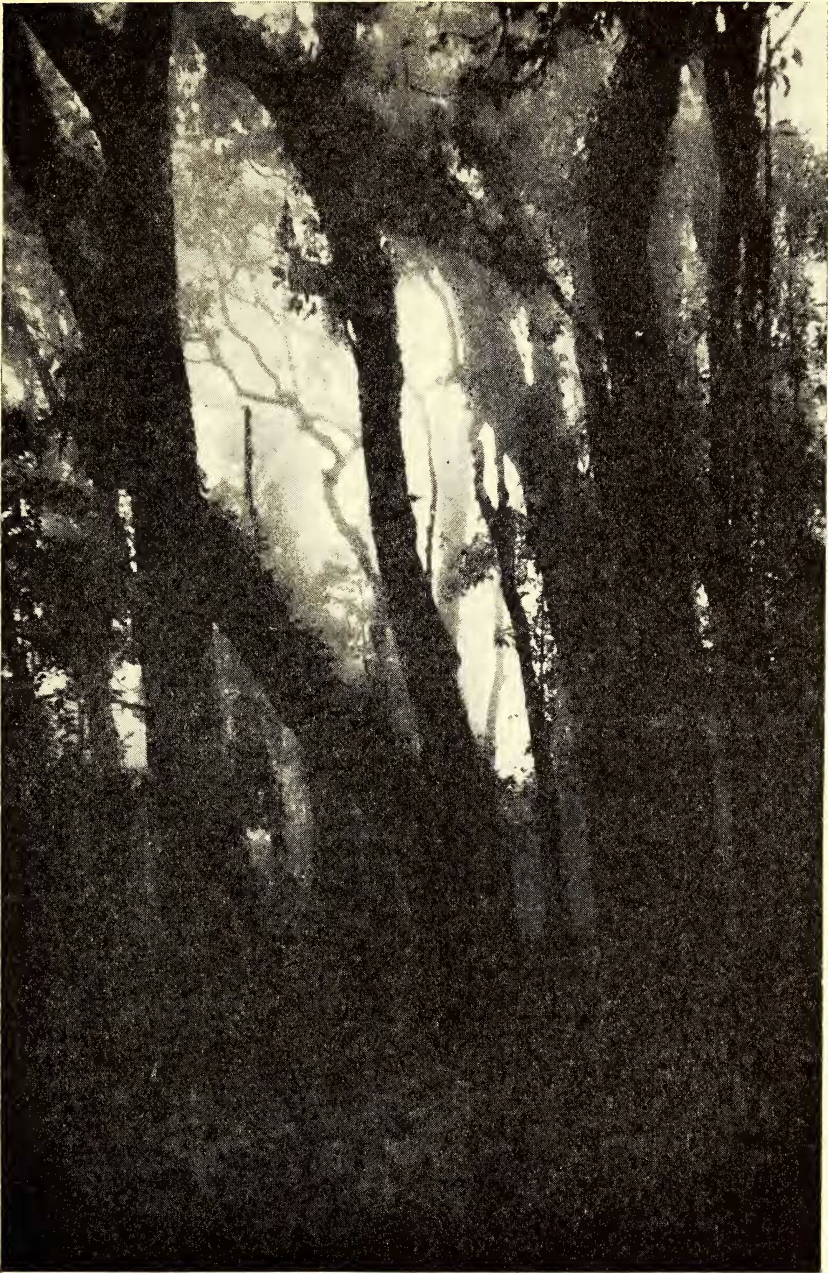


PLATE 13. *QUERCUS ESESMILENSIS*. Typical habitat at border of cloud forest.

Subgen. *Erythrobalanus* (Spach) Oerst.

*QUERCUS HONDURENSIS* Trel. Previously known from El Salvador in the Department of Chalatenango and the Department of Morazán, additional localities in the latter department are now recorded for this species.

DEPT. MORAZÁN. Shrubby tree 10 feet tall; oak woods, elevation *ca.* 4500 feet; south-facing slope of easternmost peak, Mount Cacaguatique, January 2, 1942, 699. Spreading tree 18 feet tall, very young leaves dark red, strongly revolute; oak woods, on north-facing slope, elevation *ca.* 3800 feet; *ca.*  $\frac{1}{2}$  mile northeast of finca of General J. T. Calderón, Mount Cacaguatique, January 6, 1942, 736. Small trees *ca.* 20 feet tall; oak woods on north-facing slope, associated with *Pinus oocarpa* Schiede, elevation *ca.* 4250 feet; *ca.*  $\frac{3}{4}$  mile east of finca of General J. T. Calderón, Mount Cacaguatique, January 11, 1942, 762, 762A. Young tree 7 feet tall; oak-pine woods, on road bank, elevation *ca.* 4000 feet; *ca.*  $2\frac{1}{4}$  miles east of finca of General J. T. Calderón, Mount Cacaguatique, January 11, 1942, 765. Acorns and cups from under trees conspecific with no. 765; elevation 3050 feet; *ca.* 4 miles east of finca of General J. T. Calderón, Mount Cacaguatique, January 11, 1942, 768.

*QUERCUS SAPOTAEFOLIA* Liebm. Previously known from only one locality in the Department of Chalatenango, this species may now be reported from another station.

DEPT. CHALATENANGO. Tree *ca.* 18 feet tall; small stand on north-facing slope, elevation *ca.* 5200 feet; along trail from San Ignacio to Las Pilas, west side of Los Esesmiles, March 22, 1942, 1110.

*QUERCUS EUGENIAEFOLIA* Liebm. Not previously recorded from El Salvador. The following collection represents a considerable extension of its known range from Panama and Costa Rica.

DEPT. CHALATENANGO. Straight-trunked tree 45–50 feet tall, bark gray, longitudinally very shallowly fissured; border of cloud forest, on north-facing slope, elevation *ca.* 7200 feet; east side of Los Esesmiles, March 18, 1942, 1089.

*QUERCUS SEEMANNI* Liebm. Previously known only from Panama and Costa Rica, this species is here recorded for the first time from El Salvador.

DEPT. CHALATENANGO. Specimens from leaders 10–12 feet tall, arising from fallen tree 25 feet long; open, north-facing canyon slope, elevation *ca.* 7200 feet; east side of Los Esesmiles, April 1, 1942, 1182. Straight-trunked tree 50–55 feet tall; cleared field on north-facing slope, elevation *ca.* 7100 feet; east side of Los Esesmiles, April 4, 1942, 1202.

*QUERCUS ACATENANGENSIS* Trel. Not previously reported south of Guatemala where it is very widespread and abundant.

DEPT. CHALATENANGO. Spreading tree *ca.* 20 feet tall, elevation *ca.* 6000 feet; beside trail from San Ignacio to Las Pilas, west side of Los Esesmiles, March 22, 1942, 1115.

*QUERCUS FLAGELLIFERA* Trel. Reported here for the first time from El Salvador. Widespread in Guatemala, although sparsely distributed.

DEPT. CHALATENANGO. Large, old tree, young foliage bronze-green, shining, leaves undulate margined; cloud forest on north-facing slope, elevation *ca.* 7200 feet; east side of Los Esesmiles, March 15, 1942, 1066.

*QUERCUS SKINNERI* Benth. Ranges from Chiapas, Mexico, to Honduras. Previously recorded from the departments of Ahuachapán, Cuscatlán, and San Vicente of El Salvador. The small-fruited form (*Q. salvadorensis* Trel.) is represented by collections from the Department of Morazán, while the typical large-fruited form is represented by a collection from the Department of Santa Ana.

DEPT. MORAZÁN. Tree 35–40 feet tall, bark dark gray; coffee grove, on northwest-facing hillslope, elevation *ca.* 4700 feet; southeast of hacienda buildings, finca of General J. T. Calderón, Mount Cacaguatique, January 16, 1942, 800. Tree 50 feet tall, bark black, thin, finely fissured; elevation *ca.* 4900 feet; at top of "saddle,"  $\frac{1}{4}$  mile due south of hacienda buildings, finca of General J. T. Calderón, Mount Cacaguatique, January 16, 1942, 801.

DEPT. SANTA ANA. Large tree 60–65 feet tall; in forest, elevation *ca.* 5500 feet; east side of Cerro del Águila, April 21, 1942, 1276.

*Quercus esesmilenis* Tucker and Muller sp. nov. Arbor ad 16 m. alta; ramuli 2–3 mm. crassi, glabrati; folia sempervirentia, 10–18 cm. longa, 3.5–6 cm. lata, lanceolata vel ovato-lanceolata, attenuato-acuta, bases acutae vel rotundatae, glabratae exceptis subter cristatis axillaribus, venis utrimque 8–10, supra impressis, subtus prominentibus anastomosantibus, petioli 10–25 mm. longi, complanati dorsale, laminae foliorum in partibus superioribus petiolorum subtiliter decurrentibus; fructi biennes, cupulae 16–20 mm. latae, 5–10 mm. altae, squamae stricte appressae, glandes 20–25 mm. longae, 18–22 mm. latae, ovoidea,  $\frac{1}{5}$  inclusae.

Tree 40 or 50 feet tall; twigs 2–3 mm. thick, fluted, at first loosely fulvous-stellate-tomentose, very quickly glabrate, dull brown or grayish with inconspicuous lenticels; buds about 2 mm. long, subrotund, light brown, dull or shiny, glabrate except for the ciliate scale margins; stipules 9–13 mm. long, broadly ligulate, dorsally glabrous, ventrally fulvous-stellate-tomentose, very quickly caducous; leaves evergreen, rather thick and coriaceous, 10–18 cm. (or 23 cm.) long, 3.5–6 (or more) cm. broad, narrowly



PLATE 14. *QUERCUS ESESMILENSIS*. Branchlet and fruits. (Note the persistent fulvous axillary tufts on ventral surface of leaf.)

elliptic-ovate to ovate or lanceolate, attenuately acute, the drip-tips without aristae, the bases often slightly unequal, rounded to acute, entire or rarely coarsely few-toothed, margins somewhat undulate, crisped, finely revolute, blades densely stellate-tomentose upon unfolding, quickly glabrate except the persistent fulvous axillary tufts beneath, both surfaces rather dull; veins 8-10 on each side, much branched and obviously anastomosing throughout, principal veins impressed above and raised within the depressions, quite prominent and reticulate beneath; petioles 10 to usually 15 or 25 mm. long, dorsally flattened, becoming glabrate, the leaf blade minutely decurrent on the upper portion; pistillate catkins 5-10 mm. long, 1- or 2-flowered, pedunculate; fruit biennial, solitary or paired on a peduncle 10-15 mm. long; cups 16 to usually 18 or 20 mm. broad, 5-10 mm. high, saucer-shaped to sub-hemispheric, margins not inrolled, scales flat, closely appressed, finely canescent but the tips glabrous, light brown and shiny; acorns usually 20-25 mm. long, 18-22 mm. broad, sometimes smaller, ovoid, broadly rounded to truncate at apex,  $\frac{1}{5}$  included.

DEPT. CHALATENANGO. Large tree *ca.* 50 feet tall; border of cloud forest, on northwest-facing slope, elevation *ca.* 7700 feet; east side of Los Esesmiles, April 3, 1942, 1198 (type, Herb. Univ. Calif. no. 694107). Acorns from under trees conspecific with no. 1198; cloud forest, elevation *ca.* 8900 feet; summit of southern peak of Los Esesmiles, April 3, 1942, 1199 (description of fruit from this collection). Tree *ca.* 40 feet tall; cloud forest, elevation *ca.* 8500 feet; east side of Los Esesmiles, March 24, 1942, 1126.

*Quercus esesmilensis* is a member of the series *Acatenangenses* Trel. In Muller's key to the species of Central American *Quercus* (p. 17), *Q. esesmilensis* would fall between *Q. acatenangensis* Trel. and *Q. conspersa* Benth. It differs from *Q. conspersa* in its minutely winged petioles, veins impressed above and very prominently reticulate beneath, leaf surfaces not yellow-glandular-puberulent beneath, lack of aristae on the apical tips or on the rare teeth, and in its rather large fruit. Although *Q. esesmilensis* is more closely related to the polymorphic *Q. acatenangensis* than to any other, it is readily distinguished by its larger leaves, veins impressed above, reticulum very prominent beneath, larger fruit included only at the base, and its very shallow cups. Immature leaves of *Q. esesmilensis* do not exhibit the prominent reticulum. From superficially similar forms of *Q. Seemanni*, *Q. esesmilensis* is distinguished by its biennial fruition and its very shallow cups. In its highly developed drip-tip this species reflects the impact of a very humid habitat, a response exhibited by divers species of the genus.

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